REMARKS

Claim Rejections 35 U.S.C. § 103 (a)

The Examiner has rejected claims 31-43 and 45-54 under 35 U.S.C. §103 (a) as being unpatentable over Efland et al. (US 6,025,275) and Byrne (US 5,136,364) in view of Lou (US 5,759,906).

Applicant respectfully disagrees with the Examiner. It is Applicant's understanding that the cited references of Efland et al., Byrne, and Lou, individually or collectively, fail to teach or render obvious Applicant's invention as claimed in claims 31-43 and 45-54. Applicant teaches and claims a method of fabricating a device which has low bond pad-to-adjacent metal member capacitance and which provides a hermetic seal of the substrate.

Applicant's claimed invention teaches a method to keep capacitance low in a device by forming a first material (310) over a bond pad (304) and a first member (306), where the first material (310) has a low dielectric constant, and where the first material (310) has at least a minimum thickness that is sufficient to completely fill a gap (308) between the bond pad (304) and the first member (306). See Figure 3b. Also, see lines 16-17 on page 9 of the specification. The gap (308) between the bond pad (304) and the first member (306) in Applicant's claimed invention is completely filled with the low dielectric constant material (310) so as to obtain low capacitive coupling between the bond pad (304) and the first member (306). The result is improved (faster) device performance. See lines 7-10 on page 8 of the specification.

Applicant further forms a second material (312) over the first material (310), where the second material (312) is thin and resistant to moisture penetration, and where the second material (312) is kept out of the gap (308) between the bond pad (304) and the first member (306) so that the capacitive coupling between the bond

pad (304) and the first member (306) will not be increased. See Figure 3c. Also, see lines 20-22 and lines 24-25 on page 10 and lines 1-2 on page 11 of the specification.

The cited reference of Efland et al. teaches the filling of a gap between a bond pad (20) and a first member (20) with a dielectric layer (22) composed of an oxide and a nitride. See Figure 1A. Also, see lines 42-45 in Col. 3. However, oxide does not have a low dielectric constant. Furthermore, Efland et al. fails to teach that nitride, having a high dielectric constant, should be kept out of the gap between the bond pad (20) and the first member (20) in order to avoid increasing capacitive coupling between the bond pad (20) and the first member (20).

Applicant further forms an opening (316) through both the second material (312) and the first material (310) to expose a top surface of the bond pad (304) , where the opening has sidewalls which include edges of the second material (312) and edges of the first material (310). See Figure 3e. Also, see lines 13-14 on page 11 of the specification.

The cited reference of Byrne teaches the forming of an opening through a first material (12) to expose a top surface of a bond pad (11), the forming of a second material (18) over the first material (12) and the exposed top surface of the bond pad (11), and the forming of the opening again through the second material (18). Thus, Byrne teaches a "wraparound effect" in which the second material (18) completely wraps around the first material (12) such that the sidewalls of the opening only uncover the second material (18). See Figure 4. Also, see lines 30-34 in Col. 2 and lines 1-3 in Col. 3.

In the opinion of the Examiner, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of the processes of Efland et al. and Byrne by including the teachings of Lou. See lines 12-14 on page 4 of the Office Action dated October 22, 2002.

Applicant respectfully wishes to point out to the Examiner that the Examiner is mistaken in his characterization of the teachings of Lou. In fact, Lou does not teach the element of Applicant's claimed invention in which the gap between the bond

pad (304) and the adjacent metal interconnect (306) is completely filled with a first material (310) having a low dielectric constant, such as a first material that is doped with fluorine atoms. See lines 7-10 on page 8 of the specification.

On the contrary, Lou first deposits and patterns a metal layer (16) on a first insulating layer (12) on a substrate (10). See lines 30-31 in Col. 5 and Figure 3. Lou states that the metal layer (16) has a thickness of between about 4,000 and 6,000 Angstroms. See lines 38-39 in Col. 5.

Next, Lou deposits a second insulating layer (18), preferably composed of an undoped oxide, over the patterned first metal layer (16). See lines 47-49 in Col. 5 and Figure 4. Lou states that the second insulating layer (18) has a thickness of between about 500 and 2,500 Angstroms. See lines 50-56 in Col. 5. Thus, Applicant wishes to point out to the Examiner that the thickness of the second insulating layer (18) is clearly not thick enough to fill the gap between the patterned first metal layer (18). In other words, the Examiner is not justified in relying on Lou to state that it would be obvious to one of ordinary skill in the art to keep the second insulating layer (18) out of the gap between the patterned first metal layer.

Then, Lou deposits a spin-on glass (SOG) multilayer (20), composed of at least four layers, over the second insulating layer (18) to fill the regions (3) between the metal lines (16) formed from the patterned first conductive layer. See lines 58-62 in Col. 5 and Figure 5. Lou states that the SOG multilayer (20) has a thickness of between about 3,600 and 4,400 Angstroms. See lines 5-8 in Col. 6. Applicant wishes to point out to the Examiner that the SOG multilayer (20) must have such a thickness to fill the gap between the patterned metal layer (18). Again, this is because the second insulating layer (18) is clearly not thick enough to fill the gap. Applicant wishes to point out to the Examiner that the range of thicknesses for layers 16, 18, and 20, as stated by Lou, is consistent with this conclusion, viz. 500 + 3,600 is very close to 4,000 and 2,500 + 4,400 is in the vicinity of 6,000. The Examiner is also not justified in relying on Lou to state that it would be obvious to one of ordinary skill in

the art to keep the SOG multilayer (20) out of the gap between the patterned first metal layer.

It should also be noted that neither the second insulating layer (18) nor the SOG multilayer (20) has a low dielectric constant. Lou specifically teaches a different embodiment of his invention that deposits a low dielectric constant multilayer (30). However, Lou still teaches forming the low dielectric constant multilayer (30), instead of the SOG multilayer (20), over the second insulating layer (18). See line 34 in Col. 7 and Figure 10. Lou states that the low dielectric constant multilayer has a thickness of between about 7,600 and 8,400 Angstroms. See lines 53-54 in Col. 7. Thus, contrary to the assertion of the Examiner (see lines 8-11 on page 4 of the Office Action dated October 22, 2002), Lou does not teach forming the fluorine-doped silicon dioxide to fill the gap in order to reduce the capacitance between lines.

Applicant also wishes to point out to the Examiner that neither the second insulating layer (18) nor the SOG multilayer (20) nor the low dielectric constant multilayer (30) is resistant to moisture penetration.

Conclusion

Combining the method of Efland et al., the method of Byrne, and the method of Lou will not produce the method claimed in Applicant's claimed invention. Thus, Applicant submits that the three references cited by the Examiner do not, individually or collectively, teach, suggest, or render obvious the invention as claimed by the Applicant.

In view of the foregoing, Applicant respectfully requests the Examiner to withdraw the rejections to claims 31–43, 45-54 under 35 U.S.C. §103 (a).

Applicant believes that all claims pending are now in condition for allowance so such action is earnestly solicited at the earliest possible date.

If there are any additional charges, please charge Deposit Account No. 02-2666. If a telephone interview would in any way expedite the prosecution of this application, the Examiner is invited to contact the undersigned at (408) 720-8300.

Respectfully submitted,
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